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Americas Conference on Information Systems (AMCIS)

December 2001

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Abstract

Researchers have always been anxious to analyze and explain the impact of information technology(IT) on transaction governance structures. The idea of Move-to-Market was initially proposed by Malone, Yates, and Benjamin. They claimed that markets are more communication intensive than hierarchies, and markets benefit more from communication cost reductions. Therefore, transaction structure shifts toward market as information technology advances. This paper provides additional theoretical arguments in support of the theory of move-to-market. In addition to Malone's arguments, we propose that move-to-market is due to the following factors: (1) IT reduces coordination cost, (2) IT has high rate of obsolescence and standardization, (3) IT decreases the asset specificity of other capital investments, and (4) IT increases specialization.

Introduction

Transaction governance structure mediates the exchange of goods or services between business entities. According to the traditional transaction cost theory, transaction governance structure shifts either towards market or hierarchy depending on the costs of transaction (Williamson, 1979, 1981, 1991). The costs of transactions are primarily determined by attributes of a transaction namely asset specificity, frequency, and uncertainty.

A substantial amount of research studies have supported the notions of transaction cost theory. These studies examined the constructs of asset specificity, uncertainty and frequency in relation to the selection of the transaction governance structure (Anderson & Schittlein, 1984; Masten, 1984; Monteverde & Teece, 1982; Walker & Poppo, 1991; Walker & Weber, 1984). Broadly speaking, these studies reiterate that when asset specificity is low, a market transaction structure is more economical. When asset specificity is high, hierarchy has relative advantage over market.

However, recent studies replace the dichotomous view of market versus hierarchy with a continuum of market and hierarchy at each end and a broad range of cooperative relationships in the middle. This view has been extended further by Malone and others who proposed the theory of move-to-market (Malone, Yates, & Benjamin, 1987). They argue that markets are more communication intensive than hierarchies. Therefore, markets benefit more from communication cost reductions enabled by IT. An alternate view, knows as, *Move-to-middle theory*, however, claims that IT provides efficient monitoring and incentive systems as well as low coordination cost. Thus, transaction structure will shift toward the middle, i.e., move toward market due to low coordination cost, and at the same time move toward seamless cooperation among the partners due to the efficient monitoring and incentive systems (Clemons & Row, 1992; Clemons, Reddi, & Row, 1993).

A major concern of MIS researchers examining the transaction structure is about the impact of IT on shifts in governance structure, and the directions of this shift due to information technology. A significant amount of research effort has been directed towards predicting the shifts. However, the discussions vary widely in these circumstances, and the predictions are often contradictory and mixed (Clemons, Reddi, & Row, 1993; Malone et al., 1987; Brynjolfsson, Malone, Gurbaxani, & Kambil, 1994; Walden, 2000).

The objective of this paper is to examine the issue of IT impact on shifts in governance structure and provide additional arguments foe the same. In this paper we use the functionality definition of IT, i.e., IT is the technology, which facilitates information processing, storage, and communication. (Bakos, 1985; Huber, 1991; Yates & Benjamin 1991).

Move-To-Market

We offer some conceptual arguments and support for Malone's position of *Move-to-market*. We contribute toward the perfection of this theory by providing additional arguments. We agree with Malone and others in that coordination cost reduction is an influential factor in moving transactions to the market. Nevertheless, we argue that there are other equally significant factors such as (1) obsolescence rate and standardization of IT investment, (2) IT's impact on asset specificity of other capital investments, and (3) specialization, which affect the impact of IT on governance structure shifts. These factors have not been reckoned as the influential factors for supporting move-to-market theory. The deliberation of these factors will strengthen the theoretical foundation of move-to-market.

In order to explain our position, we offer a model integrating traditional transaction cost theory with IT's impact studies (see Figure 1). According to traditional transaction cost theory, attributes of transaction (asset specificity, uncertainty, and frequency) determine the transaction costs, which in turn determine the choice of transaction structure. We take transaction cost theory as given and will not provide theoretical arguments for the paths under transaction cost theory (see the last tier of the model in Figure 1). The objective of the paper is to establish paths of IT's impact in relation to the attributes of transaction structure. The model integrated the path of the original theme of Malone and others as well as the additional paths to be addressed in this paper.

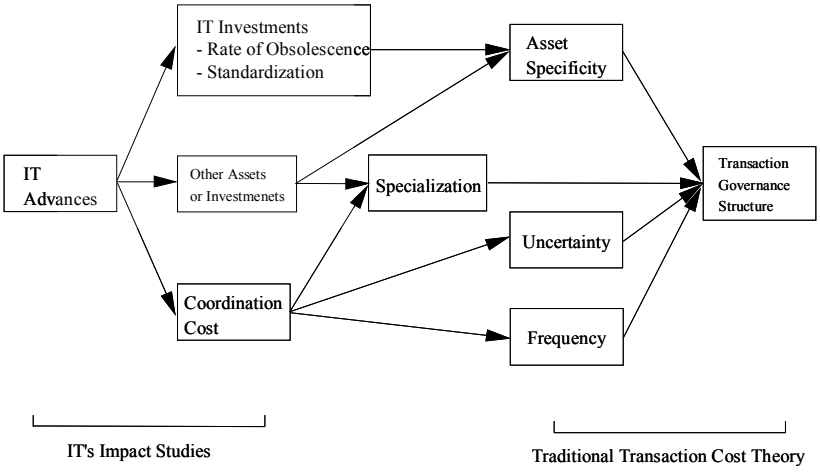

Figure 1. Theoretical Model

Coordination Cost Reduction

Transaction cost theory assumes that (1) some agents in the market have a propensity for opportunism, and (2) decision makers have limitations in terms of (a) rationality in formulating and solving complex problems and (b) their capability to process information. Based on the assumption of limitations, transaction uncertainty and frequency become deterministic factors for estimating transaction costs (Williamson 1981, 1991). Studies have identified significant correlations between uncertainty/frequency and transaction governance structure. Transactions with high uncertainty and high frequency are usually associated with high market transaction cost (Anderson & Schittlein, 1984; Masten, 1984; Monteverde & Teece, 1982; Walker & Poppo, 1991; Walker & Weber, 1984).

To integrate Malone's theory with transaction cost theory, we need to establish the path between coordination cost and uncertainty/frequency. We make explicit connection between Malone's argument and transaction cost theory by proposing a path of IT Advances → Coordination Cost → Uncertainty & Frequency → Transaction Governance Structure (see Figure 1). According to Galbraith, uncertainty is the absence of information, and uncertainty is the difference between the amount of information required to perform a task and the amount of information already possessed by the organization (Galbraith, 1977). By definition, the primary role of information processing is to reduce uncertainty. Cost reductions in information processing and coordination decrease uncertainty. This establishes the linkage between coordination cost and uncertainty/frequency. We summarize the interactions along the entire path as: IT reduces coordination cost, increases the capacity of information processing, decreases uncertainty, makes frequency less relevant, and in due course shifts transaction governance structure toward market.

Characteristics of IT Investment

IT has two characteristics, which play important role in defining the asset specificity. They are rate of obsolescence and standardization.

High Rate of Obsolescence of IT Investments

IT largely facilitates information processing, storage, and communication. IT has been advancing rapidly in all these three functional areas. In 1965, Gordon Moore guessed that the number of electronic devices on microchips would roughly double every year. The prediction has been known as Moore's Law. Over the years, the doubling period has varied between nine months and two years, but the prediction itself has remained remarkably stable (Mann, 2000). Table 1 summarized the advances and cost reductions of IT. The computing power and storage have slightly lower growth rate than bandwidth. Bandwidth outside the computer (optical) is growing much faster than bandwidth inside the computer (electronic). Backbone fiber network has superior capacity over local networks. The future limits in all three areas are unforeseen (Reed, 1999). At least in next ten years, Moore's law will hold steady.

The growth in all three functional areas is accompanied with price drops. Costs of storage and processing decrease at higher rates than bandwidth. Processing gains the better performance improvement. Hardware cost becomes a small portion of the total IT expenditure. According to surveys, 26% of total IT expenditure is hardware and software, and the rest is labor costs (Weinberg, 1999; Anonymous, 1998). In managing storage, the labor and software is three to ten times greater than the cost of the hardware.

Table 1. IT Growth and Price Reduction

Functionality	Growth	Price Decrease	Performance Improvement
Storage	60%-100%	30%-40%	10%
Processing	40%-60%	25%-35%	30%-35%
Bandwidth	10 times	15%	-

Note: Data is summarized from "The paradox: As storage and bandwidth all drop to zero dollars, who can make a buck?" by F. Moore. *Computer Technology Review,* 20:7, 2000, pp. 139-142.

IT advances are both absolute and comparative. No other industry can match the capacity increases and cost reductions of IT industry. Figure 2 gives a comparative analysis between IT industry and six other product groups. The growth factor for IT industry is 25 and for six product groups is only 1.4. IT capital equivalency ratio drops exponentially, while the ratio of six product groups follows a linear decline.

Rapid advances and price plunges create an extremely high rate of obsolescence for IT investment. It means that IT investment has to be depreciated over a short period of time. The rate of depreciation depends on physical factors as well as economic factors. Physical factors can be wear and tear; and economic factors can be obsolescence. In case of IT depreciation, obsolescence defines the rate of depreciation. Tax Reform Act of 1986 classifies computer investment as 5-year property, and investments in machinery or equipment as 10-years property.

How does high rate of obsolescence and short depreciation period relate to asset specificity? Assets are usually built for specific purposes. Asset specificity is the degree to which an asset can be redeployed to alternative uses without losing its value (Williamson 1981, 1991). If an investment is depreciated over a short period of time, then the asset has high liquidity. The value of the asset is quickly transferred into profit or loss. It also indicates that asset has low specificity. We may also argue that if the amount of undepreciated value remained in an asset is insignificant, redeploying or not has little bearing over economic loss. The conclusion is that high rate of obsolescence suggests low asset specificity. IT investment has high rate of obsolescence and depreciation, so IT has low asset specificity. Above argument support the path of IT Advances $\rightarrow$ IT investment (high obsolescence rate) $\rightarrow$ Asset Specificity $\rightarrow$ Transaction Governance Structure.

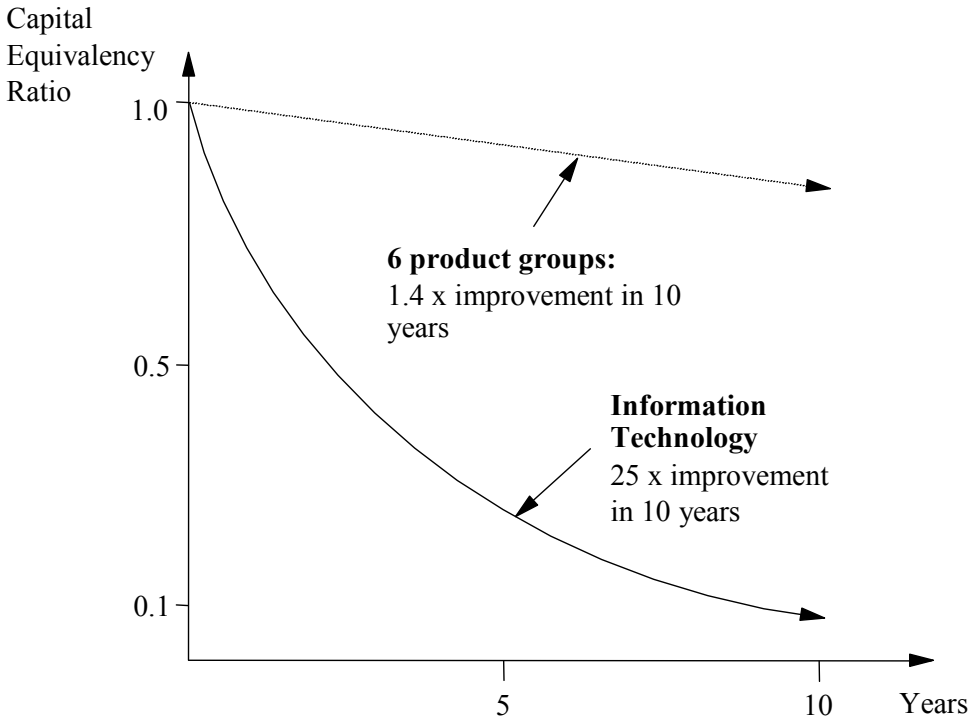

Figure 2. Capital Equivalency Ratio: Information Technology versus Six Product Groups

Note: US. Bureau of Labor Statistics, producer price index, compensation per hour, nonfarm, business sector, 1950-1980.

Standardization

General speaking, investments in specialized technical know-how have a stronger influence than those in specialized physical capital on the decision to integrate production within the firm (Masten, Meehan, & Snyder, 1989). Different from typical technical investments, IT investment is not necessarily relationship-specific and need not be considered as asset specific because the standardization of IT. The hardware is typically standard and rarely needs to be customized for the transaction. Software, especially markup languages and open system architecture, provides common standards with flexibility and scalability. Moreover, electronic transaction is moving toward industry standards, thereby reducing relationship-specificity. Together, software, hardware, and industry transaction standards reduce the asset specificity of IT. The result is that IT Advances → IT investment (standardization) → Asset Specificity → Transaction Governance Structure.

Other Assets and Investments

Asset specificity is categorized into six distinctions: physical asset, human asset, site asset, brand name capital, dedicated assets, and temporal specificity (Williamson 1981, 1991). We are primarily concerned with the first two categories, physical asset and human asset. The objective here is to investigate IT's impact on physical asset specificity and human asset specificity.

IT is viewed as having a broad and profound impact on both organizational technology and production technology (Bakos 1985). According to the Management in the 1990's Research Program, the range of IT's impact includes changes in (1) production, (2) coordination, and (3) management (Scott Morton, 1991). Production includes physical production and information/knowledge

production. The impact on coordination is in terms of the distance, time and memory capacity. IT affects management work by facilitating direction setting and control.

In physical production, IT has applications from computer-aided design to computer integrated manufacturing (Fogarty, Blackstone, & Hoffmann, 1991). IT not only increases the efficiency of physical production, but also the flexibility of it. A typical example is flexible manufacturing systems, which can deliver economy of scope and economics of scale simultaneously (Gupta & Goyal, 1989). Computer information systems also build flexibility and scalability into process planning, material and resource planning, and inventory control. Flexibility is the ability to change between products or customers with minimal costs and delays (Vonderembse and White 1996). By definition, flexibility is not transaction, product, and demand specific. With high degree of flexibility, a physical asset doesn't have to be designated to a specific production or transaction. Flexibility reduces asset specificity.

In term of human asset specificity, IT has made human expertise and knowledge more accessible. For example, Digital Equipment Corporation (DEC) developed XCON, an expert system that assists the professionals in computer configuration. The sources of knowledge and expertise can be quickly dispersed and shared globally (Sviokla, 1990). Information and knowledge used to be "sticky" asset (Hippel, 1994). Computer information systems lift the constrains on time and location and make information and knowledge available any time and anywhere. Due to the IT advances, human asset in term of knowledge and expertise becomes less sticky and less specific.

Since IT potentially decreases the specificity in physical assets and human assets, IT advances may lead toward market transaction structure, i.e. IT Advances → Other Assets and Investments → Asset Specificity → Transaction Governance Structure.

Specialization

IT promotes specialization in two ways, by increasing production scale and by generating aggregated demand. As mentioned earlier, IT increases production scales and scopes of other capital investments. The productivity of physical asset as well as human asset increases as the result of IT investment. It is especially so in manufacturing sector (Brynjolfsson & Hitt, 1996; Brynjolfsson, 1993). IT increases specialization by modernizing other capital investments. With modernization and large scale of production, firms increasingly depend on the market to realized the benefit (IT Advances → Other Capital Investments → Specialization → Transaction Governance Structure).

Specialization is nurtured as well as limited by the extent of the market. Aggregated demand from the market serves two functions in supporting specialization: (1) Aggregated demand justifies the capital investments in large-scale production, and realizes the economics of scale; (2) Aggregated demand manifests the learning curve effect - the cost for performing a task decreases with increasing repetition (Stevenson, 1999). The high degree of specialization increases the dependence of the market (Smith 1776; Case, 2001).

IT plays an important role in generating aggregated demand. Increased connectivity and information processing power creates a market space with no constrain of time and location. Such magnitude of information reach has never been achieved before the time of information technology (Evans, & Wurster, 2000). Cathcart claims that, "the information age will permit and increase returns from yet greater degrees of specialization" (Cathcart, 1996). He argues that cost, speed, and accuracy of IT enable specialists to expand customer base and deliver specialized services over a large market. Medical specialists can obtain test results, diagnose illnesses, and prescribe treatments remotely in real time. The provision of many specialized services becomes more impersonal and market oriented. The cost and quality may become more important than long-term relationships. In conclusion, IT increases the market-aggregated demand, nurtures the specialization, and moves transaction into market - IT Advances → Coordination Cost → Specialization → Transaction Governance Structure.

Conclusions

It is important to distinguish increase market competitiveness and increase the use of market transaction structure. Move-to-market is to increase the use of market transaction structure. Move-to-market does not necessary increase the market competitiveness. On the contrary, we propose that move-to-market increase specialization. If market size is constant, increasing specialization implies increasing oligopoly. In banking industry, we have observed the interstate bank acquisitions and interstate branching by merger and consolidation. At the same time, we also evidenced the disaggregations of banking functional operations (Teixeira 1992). Which direction is transaction structure shifting? What are the influential factors? These and other questions

remain as the unsolved puzzles in academia as well as for practitioners. This paper is only an effort to look at the phenomenon from one perspective, move-to-market. The transaction structure shift shall be examined further from different perspectives. However, our framework provides theoretical foundation for experimental studies. Each path in the model can be tested by experiments.

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